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A new species of *Melanohalea* (*Parmeliaceae*) from the Tibetan Plateau

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Abstract —A new *Melanohalea* species characterized by the lobules developed from hemispherical papillae, *M. lobulata*, is described from the Tibetan Plateau. A key to the twenty known *Melanohalea* species is also provided.

Keywords — Asia, China, lichen, taxonomy

Introduction

The lichen genus *Melanohalea* O. Blanco et al. in the *Parmeliaceae* was segregated from *Melanelia* Essl. based on molecular as well as chemical and morphological data (Blanco et al. 2004). The genus is morphologically characterized by an upper surface usually with pseudocyphellae, by a non-pored epicortex, and by a medulla containing depsidones or lacking secondary compounds (Blanco et al. 2004, Esslinger 1977). The genus presently includes nineteen species known in the world (Esslinger 1977, Esslinger 1987, Galloway & Jørgensen, 1990, Divakar et al. 2001, Blanco et al. 2004, Divakar & Upreti 2005, Wang et al. 2008).

During our study of the lichen flora of the Tibetan Plateau, an interesting species of *Melanohalea* that appears to be new to science was found. Here we present a brief Latin diagnosis, an extended description, and a key to the presently known species of the genus. Two photographs of the new species are provided as well.

Materials and methods

The specimens studied were collected from the Tibetan Plateau, China, and are preserved in SDNU (Lichen Section of Botanical Herbarium, Shandong

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Normal University). The morphology of the lichen specimens was examined using a stereo microscope (COIC XTL7045B2) and a microscope (OLYMPUS CX21). Lichen substances in all specimens cited were identified using the standardized thin layer chromatography techniques (Culberson 1972). Photos of the thallus were taken under OLYMPUS SZX12 with DP70.

Key to *Melanohalea* species

1a. Thallus with soredia or isidia 2
1b. Thallus without soredia or isidia, sometimes with lobules 11

2a. Thallus with soredia 3
2b. Thallus with isidia 6

3a. Upper surface without pseudocyphellae; soralia laminal, punctiform; soredia granular to isidioid; medulla usually PD+ red-orange, with fumarprotocetraric acid and protocetraric acid ..... *M. olivaceoides*
3b. Upper surface with pseudocyphellae 4

4a. Medulla PD+ red-orange, with fumarprotocetraric acid and protocetraric acid; soredia granular to isidioid, developed from pseudocyphellae ..... *M. gomukhensis*
4b. Medulla PD–, with caperatic acid or lacking substances; 5

5a. Caperatic acid present; soralia capitate, laminal; soredia granular, pale *M. nilgirica*
5b. No substances detected; soralia punctiform, developed from pseudocyphellae; soredia coarse-grained, rather dark ..... *M. inactiva*

6a. Medulla PD+red-orange, with fumarprotocetraric acid; isidia cylindrical, dense; corticolous ..... *M. poeltii*
6b. Medulla PD–, without substances 7

7a. Isidia clavate to spathulate, distinctly hollow, developed from hemispherical to spherical papillae; usually corticolous ..... *M. exasperatula*
7b. Isidia cylindrical or granular, not distinctly hollow 8

8a. Isidia developed from conical papillae with pseudocyphellae at the tips, cylindrical, usually branched ..... *M. elegantula*
8b. Without pseudocyphellae at the tips of papillae or isidia 9

9a. Isidia developed from hemispherical papillae, cylindrical, growing into lobules usually with rhizines ..... *M. subelegantula*
9b. Isidia seldom growing into lobules 10

10a. Saxicolous, living in the Northern hemisphere; isidia developed from hemispherical papillae, cylindrical, sometimes hollow; upper surface without pseudocyphellae; apothecia unknown ..... *M. infumata*
10b. Corticolous usually, living in the Southern hemisphere; isidia developed from granular papillae, cylindrical, occasionally growing into lobules; upper surface sometimes with pseudocyphellae; apothecia common .... *M. ushuaiensis*

11a. Medulla PD+ red-orange, with fumarprotocetraric acid and protocetraric acid 12
11b. Medulla PD–or PD+ yellow, with or without norstictic acid 14

12a. Apothecia margin smooth; hymenium twice as thick as subhymenium; pseudocyphellae sparse or absent ..... *M. septentrionalis*
12b. Apothecia margin crenulate or warted; hymenium as thick as subhymenium; pseudocyphellae numerous 13

13a. Upper surface brown, rarely papillate; medulla K–; spores smaller, 11–16 × 6–9 μm ..... *M. olivacea*
13b. Upper surface yellow-brown, frequently papillate; medulla K+yellow turning dingy orange; spores larger 15–20 × 8–12.5 μm ..... *M. halei*

14a. More than eight spores per ascus (12–32) 15
14b. Eight spores per ascus or apothecia absent 16

15a. Medulla K– to K+, yellow turning orange, with or without norstictic acid; lower surface smooth to weakly trabeculate ..... *M. multispora*
15b. Medulla K–, no substances detected; lower surface strongly trabeculate ..... *M. trabeculata*

16a. Upper surface with numerous lobules or lobe-like folioles developed from papillae 17
16b. Upper surface without lobules or lobe-like folioles developed from papillae 18

17a. Papillae isidioid, with obscure pseudocyphellae at the tips; the papillae often expanding to lobe-like and laciniate folioles ..... *M. laciniatula*
17b. Papillae hemispherical, without pseudocyphellae at the tips; the papillae soon becoming elongated-ellipsoid lobules ..... *M. lobulata*

18a. Upper surface with evenly distributed and regular papillae; the papillae conical or isidioid, with obvious pseudocyphellae at the tips ..... *M. exasperata*
18b. Upper surface without evenly distributed and regular papillae 19

19a. Apothecial margin with pseudocyphellae at the tips of warts or tubercles; upper surface sometimes with unevenly distributed and irregular papillae; living in Northern hemisphere ..... *M. subolivacea*
19b. Apothecial margin with pseudocyphellae, the warts or tubercles absent; upper surface without papillae; living in Southern hemisphere ..... *M. zopheroa*

Taxonomic description

Melanohalea lobulata F.G. Meng & H.Y. Wang, **sp. nov.** Fig. 1

MycoBank MB 513104

Species lobulis elongato-ellipsoideis ex papillis a congeneribus diversa.

Typus: CHINA. Sichuan, Litang, Kazilashan, alt. 4710m, on twigs, H.Y. Wang, 20084049, 7 November 2008. (**holotypus** in SDNU).

description: Thallus foliose, appressed throughout, adnate, 2–13 cm in diameter (Fig. 1A). Lobes 0.8–2 mm broad, 100–125 μm thick, flat, short, contiguous to imbricate. Upper surface dark-brown, shiny at lobe ends, inward

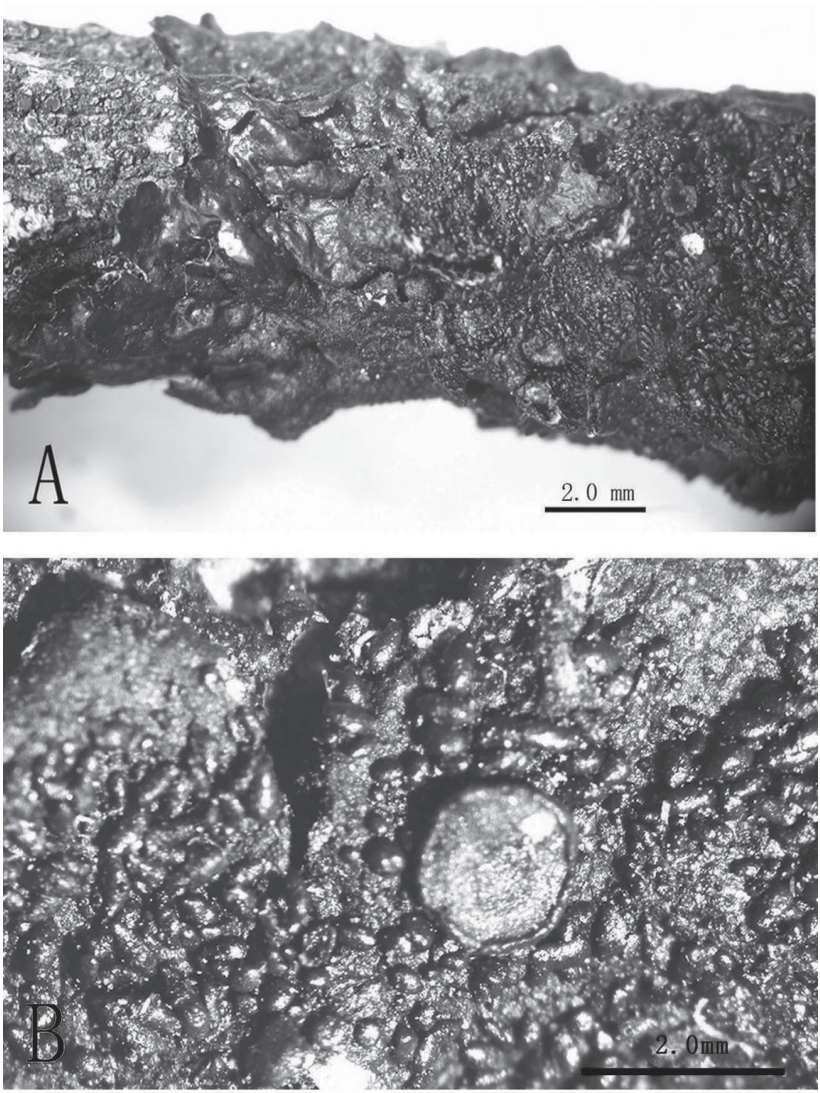

Figure 1 Photographs of the holotype of *Melanohalea lobulata*.
A. Thallus. B. Lobules and apothecium.

becoming dull; without pseudocyphellae, soredia, isidia or pruina; with numerous lobules developed from papillae, the lobules elongated-ellipsoid, simple, 0.5–0.2 × 0.1–0.3 mm, appressed to thallus, with shiny upper surface and with rhizines under their lower surface (Fig. 1B); the papillae hemispherical,

very small, soon expanding into lobules, never elongating into isidia. Lower surface black, often paler at the margin; smooth to wrinkled, dull to slightly shiny; abundantly rhizinate, the rhizines simple, concolorous with the lower surface, to 1 mm long. Apothecia common, sessile, flattening, to 2 mm in diameter; margin entire, smooth; hymenium ca. 50 µm thick; subhymenium ca. 40 µm thick; spores 8, ellipsoid to broadly ovoid, 10–12.5 × 5–7.5 µm, spore wall 1 µm thick. Pycnidia unknown.

Chemistry: Cortex K–, HNO_3–; medulla C–, K–, KC–, PD–; Constituents (31 specimens tested): no substances detected.

Distribution and substrate: At present, *M. lobulata* is known only from the type locality; on twigs.

Specimens examined: **CHINA. SICHUAN: Litang Co.** kazilashan, alt. 4710m, on twigs 7/xi/2008, *H. Y. Wang 20084035*, *20084037, 20084038, 20084039, 20084040, 20084042, 20084047, 20084048, 20084049, 20084050, 20084051, 20084052, 20084053, 20084054, 20084055, 20084056, 20084057, 20084103, 20084104, 20084105, 20084106, 20084107, 20084108, 20084109, 20084110, 20084111, 2008112, 20084113, 20084114, 20084115, 20084116* (SDNU).

Comments —The elongated-ellipsoid lobules developed from papillae distinguish *M. lobulata* from all the other *Melanohalea* species. In addition to *M. lobulata*, *M. subelegantula* (Essl.) O. Blanco et al. also has lobules on upper surface. *Melanohalea lobulata* can be clearly separated from *M. subelegantula,* however, by lacking isidia, and by having simple rather than branched lobules, a darker upper surface, common rather than rare apothecia, and entire rather than papillae-crenulate apothecial margins. *Melanohalea laciniatula* (Flagey ex H. Olivier) O. Blanco et al. has lobe-like folioles on the upper surface, but does not have true lobules. *Melanohalea lobulata* can be readily distinguished from *M. laciniatula* by the hemispherical rather than isidioid papillae, and by lacking pseudocyphellae at the tips of the papillae.

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